ThinkCore DA-661/662/663
Hardware User's Manual

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ThinkCore DA-661/662/663
Hardware User's Manual

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Table of Contents

Chapter 1 Introduction 1-1

Overview 1-2
Package Checklist 1-2
Product Features 1-3
Hardware Specifications 1-3
Hardware Introduction 1-4
Appearance and Dimensions 1-4
Hardware Block Diagram 1-5
LED Indicators 1-7
Reset Button 1-7
LCD Screen 1-7
Push Buttons 1-8
Real-time Clock 1-8
Placement Options 1-8
Desktop 1-8
Rack Mounting 1-8
Connecting the Hardware 1-9
Wiring Requirements 1-9
Connecting the Power 1-9
Connecting to the Network 1-10
Connecting to a Serial Device 1-10
Connecting to the Console Port 1-10
PCMCIA 1-11
CompactFlash 1-11
USB Host 1-11

Appendix A Service Information A-1

MOXA Internet Services A-2
Problem Report Form A-3
Product Return Procedure A-4

1

Introduction

The ThinkCore DA-661/662/663 are RISC-based, ready-to-run embedded computers designed for industrial data acquisition applications. Each model has 16 RS-232/422/485 serial ports, 1 CF socket, 1 PCMCIA socket, and 2 USB hosts based on the Intel XScale IXP-425 communication processor. In addition, the DA-661 has two Ethernet ports, the DA-662 has 4 Ethernet ports, and the DA-663 has 2 fiber Ethernet channels. The casing is a standard 1U, 19-inch wide rack-mounted rugged enclosure. The robust, rack-mountable mechanism design provides the hardened protection needed for industrial environment applications, and makes it easy for users to install the DA-661/662/663 on a standard 19-inch rack. The DA-661/662/663 are ideal for applications that require a distributed embedded technology, such as SCADA systems, plant floor automation, and power electricity monitoring applications.

The following topics are covered in this chapter:

- **Overview**
  - Package Checklist
  - Product Features
  - Hardware Specifications
- **Hardware Introduction**
  - Appearance and Dimensions
  - Hardware Block Diagram
  - LED Indicators
  - Reset Button
  - LCM Screen
  - Push Buttons
  - Real-time Clock
- **Placement Options**
  - Desktop
  - Rack Mounting
- **Connecting the Hardware**
  - Wiring Requirements
  - Connecting the Power
  - Connecting to the Network
  - Connecting to a Serial Device
  - Connecting to the Console Port
  - PCMCIA
  - CompactFlash
  - USB Host

Overview

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The DA-661/662/663 are suitable for IT control room applications, the critical assets used in the control and automation system of industrial plant floors, and in electric power utility substations. The DA-661/662/663 can accept a wide range of power inputs (from 100 to 240V), which means that they can be connected to AC power lines. Because of the no hard disk, fan-less, energy efficient design, the DA-661/662/663 minimize heat generation, can operate around the clock, year in and year out, in heavy duty, harsh industrial environments, delivering the kind of reliable computing power expected of a multifunctional controller.

Choose from models of the DA-661/662/663 that come pre-installed with the open-standard Linux OS, or the commonly used WinCE OS. The built-in SDK makes program development easy by allowing you to follow the common programming procedures used on a standard PC. All of the software you develop for your own applications can be stored in the onboard Flash memory. The DA-661/662/663 embedded computers are ideal for creating control systems with distributed architecture that are based on embedded technologies. Typical applications include SCADA systems, plant floor automation, and power electricity monitoring.

Package Checklist

Before installing the ThinkCore DA-661/662/663, verify that the package contains the following items:

- 1 ThinkCore DA-661/662/663 Embedded Computer
- 19-inch Rack-Mount Kit
- Quick Installation Guide
- Document & Software CD
- Cross-over Ethernet cable
- CBL-RJ45M9-150: 150 cm, 8-pin RJ45 to Male DB9 serial port cable
- CBL-RJ45F9-150: 150 cm, 8-pin RJ45 to Female DB9 console port cable
- Power Cord
- Product Warranty Statement

NOTE: *Please notify your sales representative if any of the above items are missing or damaged.*

Product Features

- Intel XScale IXP-425 533 MHz Processor
- On-board 128 MB RAM, 32 MB Flash ROM
- 16 RS-232/422/485 serial ports
- 2 10/100 Mbps Ethernet (4 10/100 Mbps Ethernet for DA-662 model)
- 2 multi-mode 100BaseFX fiber channels with SC connector (DA-663)
- Standard 19-inch rack-mount installation, 1U height
- Wide range of power input voltages from 100 to 240VAC
- LCD screen and push buttons for HMI
- Ready-to-run Linux/WinCE 5.0 platform
- Robust, fanless design
- PCMCIA for wireless LAN expansion (supports 802.11b/g)
- CompactFlash for storage expansion
- USB 2.0 host

Hardware Specifications

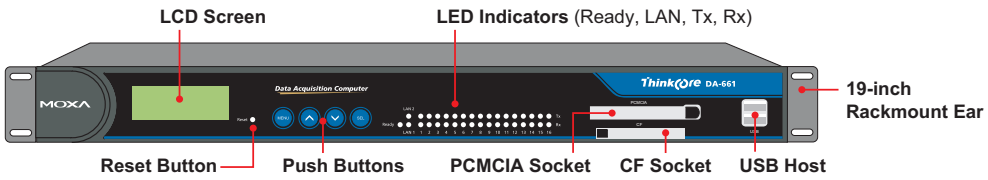
	ThinkCore DA-661	**ThinkCore DA-662**	**ThinkCore DA-663**
CPU	Intel XScale, IXP-425 (533 MHz)		
RAM	128 MB		
Flash	32 MB		
LAN	Auto-sensing 10/100 Mbps × 2 with built-in 1.5 KV magnetic isolation protection (RJ45 connector)		Multi-mode 100BaseFX fiber channel × 2 (SC connector)
Serial Ports	RS-232/422/485 × 16 (RJ45 connector)		
Serial Protection	15 KV ESD for all signals		
Data Bits	5, 6, 7, 8		
Stop Bits	1, 1.5, 2		
Parity	none, even, odd, space, mark		
Flow Control	RTC/CTS, XON/XOFF, RS-485 ADDC™		
Speed	50 bps to 921.6 Kbps		
Serial Console	RS-232 × 1 (RJ45 connector)		
USB 2.0 Hosts	2		
PCMCIA	Cardbus × 1		
Storage Expansion	CompactFlash × 1		
LCM	Text Mode (2 × 16)		
Push Buttons	4		
Watchdog Timer	Yes		
Real-time Clock	Yes		
Buzzer	Yes		
Reset Button	Reset to Default × 1		
Power Input	100 to 240 VAC		
Power	15W		
Dimensions (W × D × H)	480 × 198 × 45 mm (with rack-mount ears) 440 × 198 × 45 mm (without rack-mount ears)		
Weight	2.5 kg	2.6 kg	2.5 kg
Operating Temperature	-10 to 60°C (14 to 140°F), 5 to 95% RH		
Storage Temperature	-20 to 80°C (-4 to 176°F), 5 to 95% RH		
Regulatory Approvals	EMC: CE Class A, FCC Class A; Safety: UL, cUL, TÜV		
Warranty	5 years		

Hardware Introduction

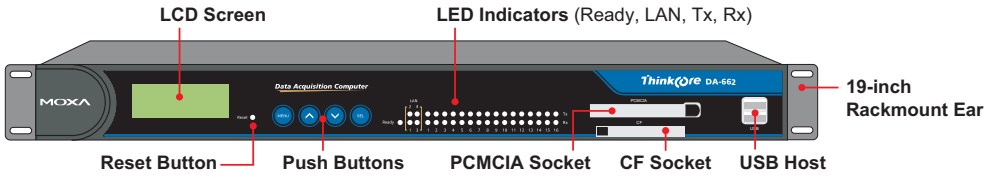
Appearance and Dimensions

Appearance

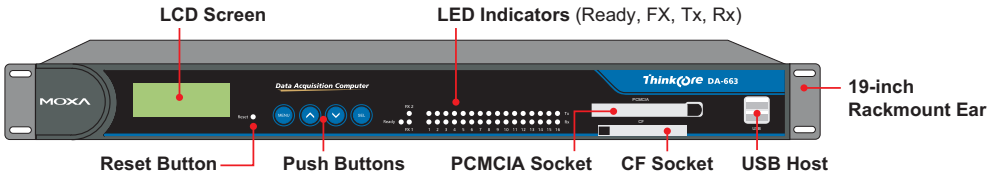
Front View of DA-661



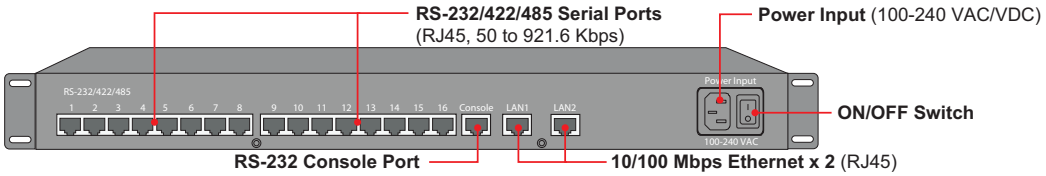
Front View of DA-662



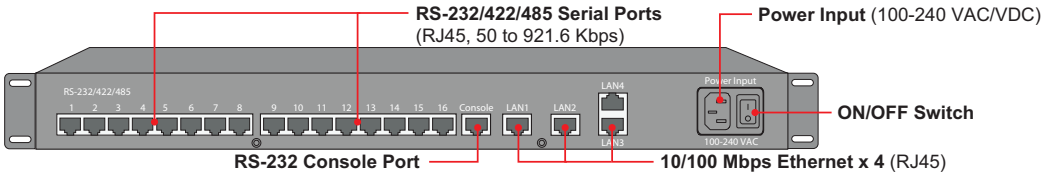
Front View of DA-663



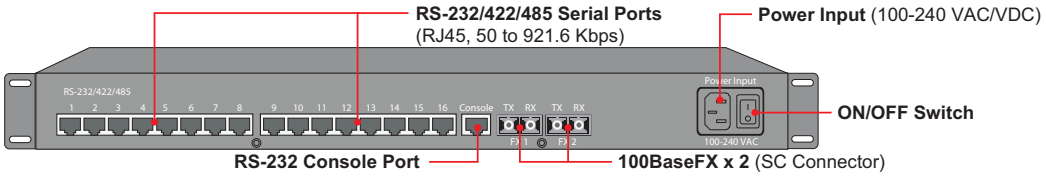
Rear View of DA-661


RS-232/422/485 Serial Ports (RJ45, 50 to 921.6 Kbps)
Power Input (100-240 VAC/VDC)
ON/OFF Switch
RS-232 Console Port
10/100 Mbps Ethernet x 2 (RJ45)

Rear View of DA-662

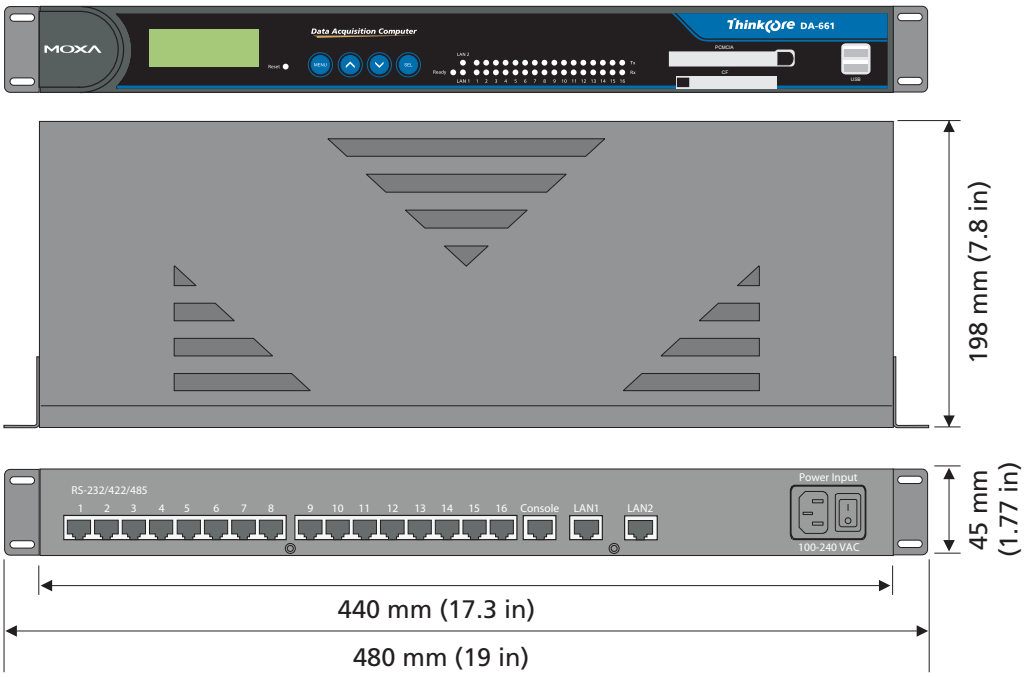

RS-232/422/485 Serial Ports (RJ45, 50 to 921.6 Kbps)
Power Input (100-240 VAC/VDC)
ON/OFF Switch
RS-232 Console Port
10/100 Mbps Ethernet x 4 (RJ45)

Rear View of DA-663


RS-232/422/485 Serial Ports (RJ45, 50 to 921.6 Kbps)
Power Input (100-240 VAC/VDC)
ON/OFF Switch
RS-232 Console Port
100BaseFX x 2 (SC Connector)

Dimensions

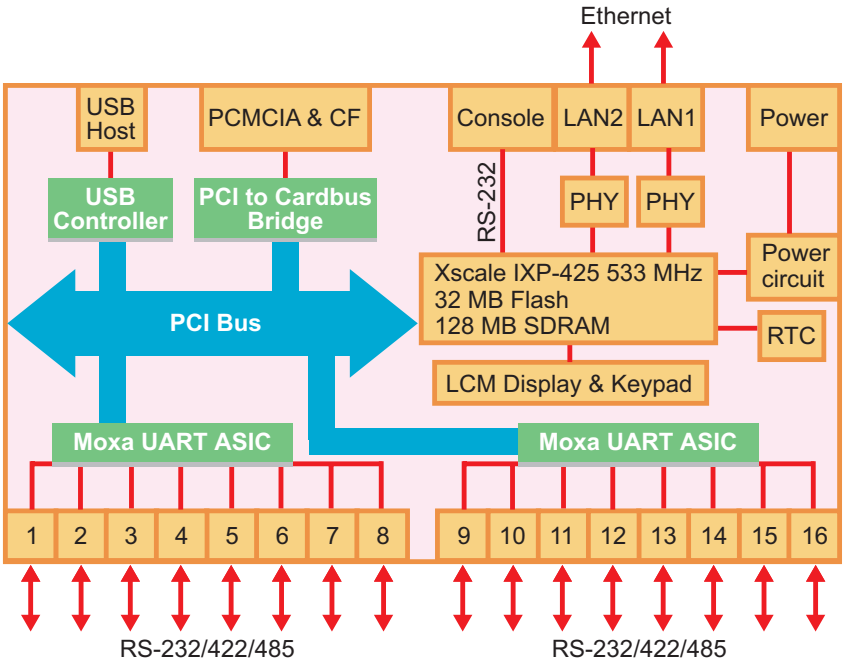
DA-661/662/663



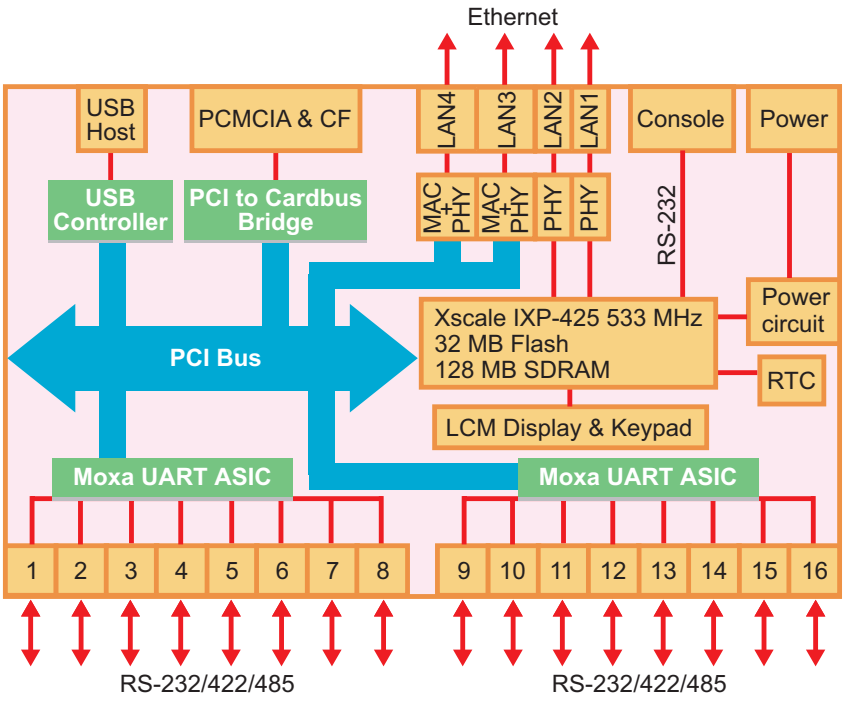
Hardware Block Diagram

The following block diagrams show the layout of the DA-661/662/663's internal components.

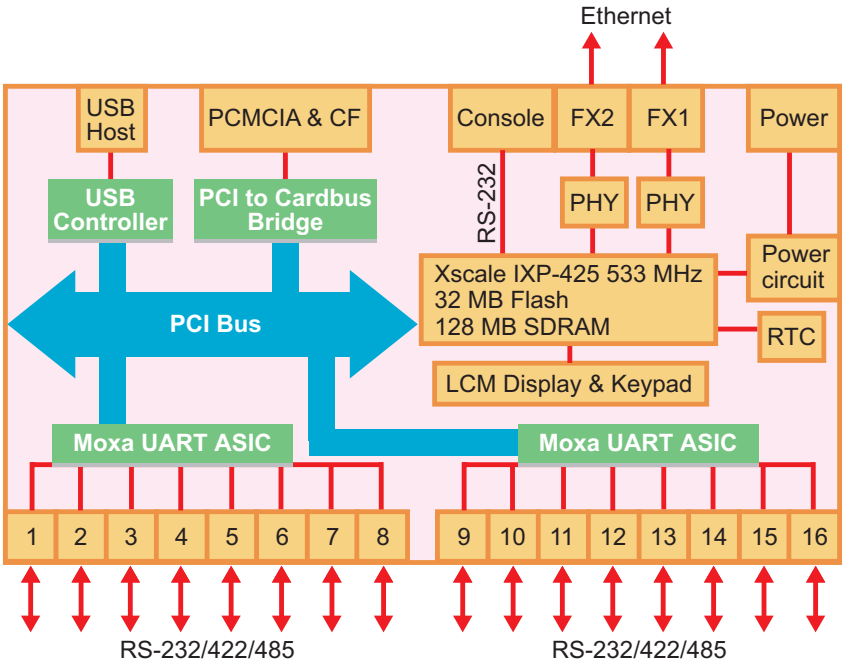
DA-661 Hardware Block Diagram



DA-662 Hardware Block Diagram



DA-663 Hardware Block Diagram



LED Indicators

LED indicators are located on the front panel of the DA-661/662/663.

LED Name	Color	Description
Ready	Red	Power is ON, and system is ready (after booting up)
LAN1, LAN2 LAN3, LAN4	Orange	10 Mbps Ethernet connection
	Green	100 Mbps Ethernet connection
P1-P16 (Rx)	Orange	Serial port is receiving RX data from the serial device
	Off	Serial port is not receiving RX data from the serial device
P1-P16 (Tx)	Green	Serial port is transmitting TX data to the serial device
	Off	Serial port is not transmitting TX data to the serial device
FX1, FX2	Green (steady on)	Fiber channel is connected
	Green (flickering)	Fiber channel is transmitting data

Reset Button

Press the **Reset** button on the front panel continuously for at least 5 seconds to load the **factory default configuration**. After the factory default configuration has been loaded, the system will reboot automatically. The **Ready** LED will blink on and off for the first 5 seconds, and then maintain a steady glow once the system has rebooted.

We recommend that you only use this function if the software is not working properly and you want to load factory default settings. To reset an embedded Linux system, always use the software reboot command **/>reboot** to protect the integrity of data being transmitted or processed. The **Reset** button is not designed to hard reboot the DA-661/662/663.

ATTENTION

Linux OS: DA-661/662/663-LX
Pressing the Reset button will only load the configuration file. All files in the /etc directory will revert to their factory defaults, and ***all user data in the Flash ROM will be deleted***.

WinCE OS: DA-661/662/663-CE
Pressing the Reset button will only load the default settings (i.e., the default registry values). All user data NOT in the Flash ROM will be deleted.

LCD Screen

The DA-661/662/663 has an LCD screen on the front panel. The LCD screen can display 16 columns and 2 rows of text. After the DA-661/662/663 boots up, the LCD screen will display the model name and firmware version:

D	**A**	**-**	**6**	**6**	**1**	**-**	**1**	**6**
V	**E**	**R**	**.**	**1**	**.**	**0**		

Push Buttons

There are four push buttons on the DA-661/662/663's front panel. The buttons are used to enter text onto the LCD screen. The buttons are MENU, ⩓ (up cursor), ⩔ (down cursor), and SEL:

Button	Action
MENU	Displays the main menu.
⩓	Scrolls up through a list of items shown on the LCD screen's second line.
⩔	Scrolls down through a list of items shown on the LCD screen's second line.
SEL	Selects the option listed on the LCD screen.

Real-time Clock

The DA-661/662/663's real time clock is powered by a lithium battery. We strongly recommend that you do not replace the lithium battery without help from a qualified MOXA support engineer. If you need to change the battery, contact the MOXA RMA service team.

WARNING

There is a risk of explosion if the battery is replaced by an incorrect type.

Placement Options

Desktop

Place your DA-661/662/663 on a clean, flat, well-ventilated desktop. For better ventilation, attach the 4 pads from the desktop kit to the bottom of the unit, and leave some space between the DA-661/662/663 and other equipment. Do not place equipment or objects on top of the DA-661/662/663, as this might damage the computers internal components.

Rack Mounting

The DA-661/662/663 is designed to be mounted on a standard 19-inch rack. Two L-shaped metal plates are included as standard accessories with the DA-661/662/663. Use the enclosed pair of L-shaped metal plates and screws to fasten your DA-661/662/663 to the rack cabinet. Two placement options are available. You can either lock the front or the rear panel of the DA-661/662/663 to the front of the rack. Each L-shaped plate has 6 holes, leaving two outer or inner holes open for your convenience.

Connecting the Hardware

This section describes how to connect the DA-661/662/663 to serial devices. The topics covered in this section are: **Wiring Requirements**, **Connecting the Power**, **Connecting to the Network**, **Connecting to a Serial Device,** and **Connecting to the Console Port**.

Wiring Requirements

ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your DA-661/662/663.

Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

Be careful when handling the DA-661/662/663. When plugged in, the DA-661/662/663's internal components generate heat, and consequently the outer casing may feel hot to the touch.

You should observe the following common wiring rules:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

  NOTE: Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

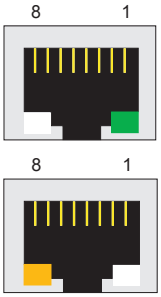
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- Where necessary, it is strongly advised that you label wiring to all devices in the system.

Connecting the Power

To power on the DA-661/662/663, use the power cord comes with the product to connect the power line to the DA-661/662/663's AC power connector. The power connector is located on the right side of the rear panel. Next, turn on the power switch. The DA-661/662/663 takes about 30 seconds to boot up. Once the device is ready, the Ready LED on the front panel will light up, and the DA-661/662/663 model name and firmware version will appear on the LCD screen.

Connecting to the Network

For DA-661 and DA-662, connect one end of the Ethernet cable to one of the DA-661/662's 10/100M Ethernet ports (8-pin RJ45) and the other end of the cable to the Ethernet network. If the cable is properly connected, the DA-661/662 will indicate a valid connection to the Ethernet in the following ways:

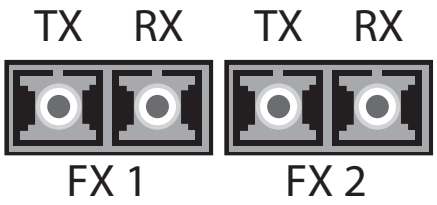


The lower right corner LED indicator glows a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flicker when Ethernet packets are being transmitted or received.

The lower left corner LED indicator glows a solid orange color when the cable is properly connected to a 10 Mbps Ethernet network. The LED will flicker when Ethernet packets are being transmitted or received.

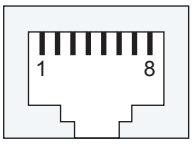
Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	---
5	---
6	ERx-
7	---
8	---

For DA-663, connect one end of the fiber channel cable (SC connector) to one of the DA-663's 100BaseFX fiber channel ports (either FX1 or FX2). The LED indicators on the front panel indicate the operation status. When the fiber channel cable is connected, the green light will glow a steady green. When data is being transmitted, the green light will flicker.



Connecting to a Serial Device

Use properly wired serial cables to connect the DA-661/662/663 to serial devices. The DA-661/662/663's serial ports (P1 to P16) use 8-pin RJ45 connectors. The ports can be configured by software for RS-232, RS-422, or 2-wire RS-485. The pin assignments are shown in the following table:



Pin	RS-232	RS-422	RS-485
1	DSR	---	---
2	RTS	TXD+	---
3	GND	GND	GND
4	TXD	TXD-	---
5	RXD	RXD+	Data+
6	DCD	RXD-	Data-
7	CTS	---	---
8	DTR	---	---

Connecting to the Console Port

The DA-661/662/663's console port is an 8-pin RJ45 RS-232 port. The port can be used to connect to the console utility from a remote console via a V90 or GPRS modem with PPP protocol. The pin definition is the same as for the serial ports (P1 to P16). For normal data acquisition applications, you should connect to the DA-661/662/663's serial ports (P1 to P16) via a V90 or GPRS modem. If you would like to use the console port for normal data acquisition applications, you can set the console port to start up via PPP protocol.

PCMCIA

The PCMCIA slot supports the CardBus (Card-32) card standard and 16-bit (PCMCIA 2.1/JEIDA4.2) card standard. It supports +3.3V, +5V, and +12V at a working voltage of 120 mA. The wireless LAN card is optional. The wireless LAN card provided by MOXA lets you connect the DA-661/662/663 to a wireless LAN. Both 802.1b and 802.11g interfaces supported.

If you need device drivers for other kinds of PCMCIA cards, contact MOXA for information on how to initiate a cooperative development project.

CompactFlash

The DA-661/662/663 provides one CompactFlash slot that supports CompactFlash type I/II card expansion. Currently, MOXA provides a CompactFlash disk for plug & play mass storage expansion. You may also use flash disks available from most computer supply outlets. The CompactFlash will be mounted at **/mnt/hda**.

If you need device drivers for other kinds of mass storage cards, contact MOXA for information on how to initiate a cooperative development project.

USB Host

The DA-661/662/663 offers 2 USB 2.0 hosts, allowing you to connect with a USB storage device. The first USB mass storage device to be connected will be mounted automatically by mount to /mnt/sda, and the second device will be mounted automatically to /mnt/sdb. The DA-661/662/663 will be un-mounted automatically with the umount command when the device is disconnected.

A

Service Information

This appendix shows you how to contact MOXA for information about this and other products, and how to report problems.

The following topics are covered in this appendix:

- **MOXA Internet Services**
- **Problem Report Form**
- **Product Return Procedure**

MOXA Internet Services

Customer satisfaction is our primary concern. To ensure that customers receive the full benefit of our products, MOXA Internet Services has been set up to provide technical support, driver updates, product information, and user's manual updates.

The following services are provided

E-mail for technical support.....support@moxa.com

Website for product information:.....http://www.moxa.com

Problem Report Form

MOXA ThinkCore DA-661/662/663 Series

Customer name:	
Company:	
Tel:	**Fax:**
Email:	**Date:**

1. **MOXA Product:** ☐ ThinkCore DA-661 ☐ ThinkCore DA-662 ☐ ThinkCore DA-663
2. **Serial Number:** _____

Problem Description: Please describe the problem clearly. Include as many details as you can. This will help us reproduce the problem, and expedite the repair of your product.

Product Return Procedure

For product repair, exchange, or refund, the customer must:

- Provide evidence of original purchase.
- Obtain a Product Return Agreement (PRA) from the sales representative or dealer.
- Fill out the Problem Report Form (PRF). Include as much details as possible for a shorter product repair time.
- Carefully pack the product in an anti-static package, and send it, pre-paid, to the dealer. The PRA should be visible on the outside of the package, and include a description of the problem, along with the return address and telephone number of a technical contact.